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HP-IL 80-COLUMN VIDEO INTERFACE Owner's Manual



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Made exclusively for Hewlett-Packard by:



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HP-IL 80-COLUMN VIDEO INTERFACE

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1 basic operation

Introduction

The MC00701A HP-IL 80-Column Video Interface provides the user with a full screen video display capability for any of the HP-IL family of portable or handheld calculators or computers. A computing device, such as the HP-41C or the HP-75C, may control the MC00701A by means of the Hewlett-Packard Interface Loop (HP-IL). The MC00701A provides a high quality (80 columns by 24 lines) video output which may be displayed on a wide variety of low cost video monitors.

Some of the features incorporated in the Mountain Video Interface are:

Two Character Sets

The MC00701A displays up to 80 columns by 24 lines of characters. Two complete character sets are included: 1) Standard 96-character upper and lower case ASCII character set which can be displayed in normal or inverse video, and 2) Roman-8 character set (ASCII with Roman extension and no inverse video).

Screen Editing Features

The MC00701A provides useful features for cursor-oriented screen editing. The MC00701A provides 48 lines of screen memory. The 24-line display area may be scrolled line by line to view the entire screen buffer. Simple escape codes issued over the HP-IL allow the cursor to be moved anywhere on the screen. Insert line, insert character, delete line and delete character escape codes permit simplified editing of the displayed text. Two types of cursors are provided to visually prompt the user. The replace cursor is a flashing block. The insert cursor is displayed whenever the MC00701A is in the insert character mode and appears as a flashing under bar.

Software Features

The MC00701A incorporates a number of software selectable options to provide the user increased versatility. The character set may be switched between ASCII and Roman 8. The display format may be switched from 80 columns by 24 lines to 40 columns by 20 lines to enable the display device to be a television set rather than a video monitor. In this mode, the user must supply an external modulator to convert the MC00701A video output to RF. The video standard may be switched between NTSC (United States, Canada, Japan) and PAL (European) standards.

Installation

The following paragraphs contain information for unpacking and installing the MC00701A.

Unpacking

Your 92198 HP-IL 80-Column Video Interface is packaged with the following:

- The MC00701A Video Interface
- Owner's Manual
- One HP-IL cable
- One 9 Vac Power Adapter
- · One video monitor cable

Power

Power for the HP-IL 80-Column Video Interface is provided by the 9 Vac adapter. To connect the AC adapter to the interface, first plug it into an AC outlet, then insert the adapter plug into the power receptacle at the rear of the Video Interface adjacent to the power switch, as shown in Figure 1-1.





Display Connections

The MC00701A video output can be routed to a monitor or a television. Connection to a TV will require an RF modulator.

Monitor Connection

To connect the HP-IL 80-Column Video Interface to a monitor, insert one end of the monitor cable into the monitor jack on the video interface front panel and the other end into the input jack on the monitor (see Figure 1-2). Either the 80 X 24 mode or the 40 X 20 mode may be used with a monitor. The MC00701A should be set to NTSC or PAL according to the type of monitor used. (See Appendix A for a complete list of escape sequences used to change modes).

NOTE

The MC00701A is supplied with a standard video cable; it connects to most of the monitors presently on the market. The jack is an RCA SO-239 phono jack. If you cannot connect the video cable to your monitor, refer to the monitor specifications and purchase an adapter that will be compatible with our cable and your monitor.



Figure 1-2 MC00701A Front Panel

Television Connection

Connect the HP-IL video cable to a modulator and the modulator to the television set, as shown in Figure 1-3. There are several RF modulators on the market. Two that work well with the MC00701A are: Model USI COMPU-MOD 4 USI Computer Products 71 Park Lane, Brisbane, Ca. 94005 Telephone (415) 468-4900

M&R Sup' R Mod M&R Enterprises 910 George St., Santa Clara, Ca. 95050 Telephone (408) 980-0160

The following example demonstrates how to connect the USI Compu-Mod 4 modulator between the MC00701A and a television.



Figure 1-3 TV-Modulator-MC00701A Diagram

- 1. Connect the video cable between the MC00701A front panel jack and the jack marked VIDEO on the Mod. 4.
- 2. Plug the USI power pack 9 Vdc connector into the Mod 4 and plug its power cord into any convenient 115 Vac duplex wall outlet.
- Connect the USI coax cable between the Mod 4 TV connector and the VHF connector on the back of the TV.
- 4. Set the Mod 4 TV-COMPUTER switch to COMPUTER.
- 5. Set the Mod 4 CH3-CH4 switch to CH3 and set the channel selector on the TV to channel 3.

NOTE

The Video Interface must be set to the 40-column by 20-line mode (a TV does not have adequate bandwidth to display 80 by 24). Setting the MC00701A in the 40-column mode is performed by sending the unit an ESC]. See Appendix A for a complete list of escape sequences used to change modes.

HP-IL Connections

The Hewlett-Packard Interface Loop can consist of several peripheral devices and a controller (handheld or portable computer). The devices may be connected in any order—but all of the interface cables must form a continuous loop. The device connected to the left HP-IL connector on the back of the handheld or portable computer, viewed from the back, will be the first device on the loop as shown in Figure 1-4.



Figure 1-4 HP-IL System

To connect the HP-IL 80-Column Video Interface to the loop as shown in Figure 1-4, first turn off the controller. Then, simply disconnect the loop in one place and connect the Video Interface in that place. (In some situations the Video Interface might be the only peripheral in the loop.)

NOTE

The system's operation may be disrupted when the loop is disconnected.

Initial System Verification

Verify that the HP-IL cables, the MC00701A Power Adapter and the video output cable are connected. Turn the MC00701A rear panel power switch ON. Turn the monitor (or TV) ON. A cursor should be displayed at the top left corner of the screen. Refer to Sections 2 through 4 for examples on how to use the unit with the HP-41C, HP-75, and HP-80 computers.

Controlling the Video Interface

The video interface operates according to information it receives on the interface loop. Specifically, it responds to the standard HP-IL messages, including special data byte messages (in the form of escape sequences, listed in Appendix A) that are interpreted as instructions.

Default Conditions

When the video interface is first turned on and linked with the HP-IL, it is in an inactive mode in the following default conditions:

80 X 24 mode NTSC Video Standard ASCII character set Blinking block cursor in home position (line 0, column 0)

NOTE

While the AC adapter is plugged in, and the power switch is on, the interface retains its display memory whether or not the monitor is turned on or connected.

2 full screen display for the hp-41c

This section contains basic procedures for operating the Mountain Computer 80-Column Video Interface with an HP-41C handheld Computer via the Hewlett-Packard interface loop.

Verify that the system has been connected as described in Section 1 (a blinking cursor should be displayed on the monitor or TV).

HP-41C Examples

All of the functions of the MC00701A HP-IL 80-Column Video Interface are available to the HP-41C by means of the HP-IL Module. You can use the two character sets (ASCII with normal or reverse video and Roman-8) and generate all of the escape sequences that the MC00701A responds to.

Video Interface and HP-IL Module Functions

Table 2-1 provides a list of functions used to send information and instructions to the MC00701A:

FUNCTION	MC00701A RESPONSE
ACA	Displays the contents of the ALPHA register. No end-of-line indicator is received.
ACCHR	Immediately displays the specified character in the 0-127 range. No end-of-line indicator is received. If a control character is specified, then the MC00701A responds to that instruction.
ADV	Receives an end-of-line indicator.
ACX	Displays the contents of the X-register. No end-of-line indicator is received.

Table 2-1 HP-41C Function List

FUNCTION	MC00701A RESPONSE
BLDSPEC	Can be used to build characters in the range 128-255, which can be recalled to the ALPHA register and sent with OUTA or PRA. See examples.
LIST	Displays the specified program lines.
OUTA	Displays the contents of the ALPHA register. An end-of- line indicator is received, unless flag 17 is set. If control codes or escape sequences are in the ALPHA register, then the MC00701A responds to those instructions.
PRA	Displays the contents of the ALPHA register. An end-of- line indicator is received.
PRBUF	An end-of-line indicator is received.
PRFLAGS	Displays flag status listing.
PRKEYS	Displays listing of current key assignments.
PRP	Displays the specified program listing.
PRREG	Displays the contents of the storage registers.
PRREGX	Displays the contents of the storage registers as specified in the X-register.
PR≥	Displays the contents of the statistical registers.
PRSTK	Displays the contents of the X-, Y-, Z- and T-registers.
PRX	Displays the contents of the X-register. An end-of-line indicator is received.

The end-of-line indicator for the HP-41C is Carriage Return (CR), Linefeed (LF)—character codes 13 and 10. Flag 17 controls how end-of-line indicators are sent to the MC00701A, using the OUTA function. If flag 17 is clear, Data Byte sequences sent to the MC00701A with **OUTA** contain an end-of-line indicator. If flag 17 is set, the HP-41C does not include an end-of-line indicator at the end of Data Byte sequences sent with **OUTA**. However, some functions *always* include an end-of-line indicator, regardless of the status of flag 17.

Sending Escape Sequences

Escape sequences can be sent to the MC00701A (as the primary device) from the HP-41C keyboard using **ACCHR** (in Auto mode), as shown in the following example:

01 27	
02 ACCHR	The character code for ESC is sent to the MC00701A.
8 3 69	
04 ACCHR	The character code for "E" is sent to the MC00701A. A Soft
85 END	Reset (ESC E) is completed.
	A determine the state of the similar the supervised. After the single the

A Cursor to Address instruction may be similarly executed. After keying in the codes for ESC and %, two inputs are required to specify the column (0 through 79) and line (0 through 23) that the cursor should go to.

The following example shows how to instruct the interface to move the cursor to column 12, line 8:

01 27

01	C 1	
82	ACCHR	Sends the ESC character code to the MC00701A.
03	37	
84	ACCHR	Sends the % character code to the MC00701A.
85	12	
86	ACCHR	Sends the column number to the MC00701A.
87	8	
88	ACCHR	Sends the line number to the MC00701A. "ESC%" is now
89	END	executed. The cursor is positioned at column 12 and line 8 of the video display.

Escape sequences can be combined with displayable characters in ALPHA data strings, then sent using **OUTA**, **PRA** or **ACA**. The strings are created by building the escape character in the X-register with **BLDSPEC**, recalling it to the ALPHA register, keying in the remainder of the sequence in ALPHA mode, then keying in words to be displayed, as shown in the following example:

014	LBL •EXMPL1•	
02	CLA	Clears the ALPHA register.
63	CLX	Clears the X-register before creating a new character.
04 05	27 BLDSPEC	Builds the ESC character (the HP-41 display is unintelligible).
86	ARCL X	Recalls the ESC character into the ALPHA register.
87	"HN HP-41"	The ESC N sequence is completed and the characters "HP-41" are placed in ALPHA.
88	CLX	Clears the X-register.
88 09	CLX 27	Clears the X-register.
88 09 10	CLX 27 BLDSPEC	Clears the X-register. Builds the ESC character.
88 09 10 11	CLX 27 BLDSPEC ARCL X	Clears the X-register. Builds the ESC character. Recalls the ESC character into the ALPHA register.
88 09 18 11 12	CLX 27 BLDSPEC ARCL X "FR"	Clears the X-register. Builds the ESC character. Recalls the ESC character into the ALPHA register. The ESC R sequence is completed.
88 09 10 11 12 13	CLX 27 BLDSPEC ARCL X "FR" OUTA	Clears the X-register. Builds the ESC character. Recalls the ESC character into the ALPHA register. The ESC R sequence is completed. The MC00701A is set to Insert Character mode (ESC N),

Displaying Inverse Video or ROMAN-8 Characters

ASCII inverse-video characters or Roman-8 characters can be easily created using **BLDSPEC.** You can build special inverse or Roman-8 characters by executing **BLDSPEC** with a character code in the X-register, recalling the character into the ALPHA register, then displaying it using **OUTA.***

The following example shows how to build and display the word "LOG" with inverse- video characters:

01+LBL *EXMPL2*	
02 CLA	Clears the ALPHA register.
03 1	
04 BLDSPEC	Sets the most significant bit to 1.
05 76 06 BLDSPEC	Specifies the character code for "L". The special inverse "L" character is now in the X-register.
07 ARCL X	Recalls the inverse "L" to the ALPHA register.
08 CLX 09 1	Clears the X-register.
10 BLDSPEC	Sets the most significant bit for next character to 1.
11 79 12 BLDSPEC 13 ARCL X	Specifies the character code for "O". The special inverse "O" is now in the X-register. Recalls the inverse "O" to the ALPHA register.
14 CLX	Clears the X-register.
15 1 16 BLDSPEC	Sets the most significant bit for next character to 1.
17 71 18 BLDSPEC	Specifies the character code for "G". The special inverse "G" is now in the X-register.
19 ARCL X 20 OUTA 21 END	Recalls the inverse "G" to the ALPHA register. Sends the word to the MC00701A.

After executing the **OUTA** at line 20, the inverse-video word "LOG" will appear on the video display.

Flags and the MC00701A

Several flags that affect how the HP-41 sends information to printer type devices are described in the HP 82160A HP-IL Module Owner's Manual. However, the calculator responds differently to flags 12 and 13 when sending information to the MC00701A. When either or both of these flags are set, a space is inserted in front of data that is sent to the MC00701A (except by **OUTA**). Double-wide and lowercase modes are not available on the MC00701A.**

- Inverse and Roman-8 characters can be sent to the MC00701A with OUTA only - ACA and PRA display characters normally.
- ** However, lowercase letters can be sent to the MC00701A using **ACCHR** with the appropriate character code in the X register.

full screen display for the hp-75

This section contains basic procedures for operating the Mountain Computer 80-Column Video Interface with an HP-75 Portable Computer via the Hewlett-Packard interface loop.

Verify that the system has been connected as described in Section 1 (a blinking cursor should be displayed on the monitor or TV).

HP-75 Example

The **ASSIGN IO** command lets you identify loop devices by a one- or two-letter name. This name can then be used to identify individual devices in other HP-75 commands. The **PRINTER IS** and **DISPLAY IS** commands use the assigned device names to specify which device or devices should be treated as a printer device or a display device.

The following example shows how to set up the HP-75 so that it treats the Mountain Video Interface as a display when it is the only peripheral connected to the loop.

1. Enter ASSIGN IO on the HP-75 keyboard and press RTN.

The HP-75 will show:

1 DEVICE(S) ON LOOP

for a moment, then

DEVICE #1 = ': '

will be displayed.

- 2. The HP-75 requires a one- or two-letter identifier for the MC00701A. Any identifier can be used, but for the example type **D1**, and press RTN.
- 3. The HP-75 can use the 80-Column Video Interface as the display device. This allows all information entered from the keyboard to be shown on the TV monitor, as will the results of all our programs or calculations. This is accomplished with the HP-75 DISPLAY IS command. This command expects to see a device identifier for the device that is to be the display. This is the identifier assigned with ASSIGN IO in step 1. Type:

DISPLAY IS ':D1'

and press RTN.

A > will appear on the screen of the monitor with a flashing cursor next to it. This is the command prompt of the HP-75. Any input from the keyboard will be displayed on the screen; it will also be displayed in the HP-75 window.

4. If the display is a TV, place the unit in the 40-column mode by entering: ESC] *

Now keyboard entry and the results of any command normally displayed as a single line in the HP-75 window will be displayed in full screen on the monitor (or TV). Refer to the Escape Codes listed in Appendix A for additional information regarding cursor placement, scrolling, and operational modes.

NOTE:

If the display is set back to the HP-75 internal display (using the **DISPLAY IS** * command) after using the Mountain Video Interface display (using the **DISPLAY IS** ':**D1**' command), the Video Interface display will still be operating, but the cursor will be turned OFF.

* ESC] can be sent from the HP-75 keyboard by holding the CTRL key depressed while pressing the BACK key, then pressing the (SHIFT -) key and finally pressing RTN. If the HP-75 is in BASIC, it will try to interpret the sequence ESC] as a Basic statement and will beep and display "Bad Statement". To avoid this, the escape sequence can be created as a Basic statement. Type the following line followed by RETURN:

DISP CHR\$ (27) & CHR\$ (93)

4 full screen display for the hp-85

This section contains basic procedures for operating the Mountain Computer 80-Column Video Interface with an HP-85 Portable Computer via the Hewlett-Packard interface loop.

Verify that the system has been connected as described in Section 1 (a blinking cursor should be displayed on the monitor or TV).

HP-85 Example

Using the MC00701A with the HP-85 requires that the HP-IL Interface drawer (HP part number 82938A) be installed in slot at the back of the HP-85. In addition, a Plotter/Printer ROM (HP part number 00085.15002) must be inserted in a ROM Drawer (HP part number 82936A) and installed in a slot at the back of the HP-85. The HP-85 uses the CRT IS function; this allows the commands and text embedded in a program to be routed to the MC00701A via the HP-IL. Keyboard entry is not sent out over the HP-IL.

The following example shows how to set up the HP-85 so that it treats the Mountain Video Interface as a display. It should be the only peripheral connected to the loop.

Enter and run the following program:

```
10 CRT IS 901,80
20 DISP USING "#,K" ; CHR$(27)&
    "E"
30 DISP CHR$(27)&"]"
40 FOR I=1 TO 5
50 DISP USING "K" ; "THIS IS A
    SIMPLE VIDEO DEMO"
60 NEXT I
70 DISP USING "K" ; CHR$(27)&"%
    "&CHR$(8)&CHR$(12)&"THIS SH0
    WS CURSOR PLACEMENT"
80 DISP USING "#,K" ; CHR$(27)&
    "%"&CHR$(20)&CHR$(18)
90 CRT IS 1
```

100 END

THIS IS A SIMPLE VIDEO DEMO and THIS SHOWS CURSOR PLACEMENT will be displayed on the monitor (or TV). Refer to the Escape Code table in Appendix A for additional information regarding cursor placement, scrolling, and operational modes.

appendix a control characters and escape sequences

Control Characters

A control character, when sent to the video interface, is not displayed, but is treated as a command.

NOTE

Control characters will be displayed if the MC00701A has been placed in the monitor mode (**ESC Y**). In this mode, escape sequences will be displayed but not executed with the exception of **ESC Z** which turns off the monitor mode.

Characters zero through 31 in the character set (see Table B-1) are control characters; however, only characters 8, 10, 13, and 27 are used by the interface. These code numbers correspond to the following commands: Back Space (BS), Line Feed (LF), Carriage Return (CR) and Escape (ESC). All other control codes received by the interface are ignored. Control characters are the same in both the ASCII (Table B-1) and the Roman-8 (Table B-2) character sets.

Carriage return will move the cursor to column zero of the current line. Line feed causes the cursor to move down one line, unless the cursor is at the bottom of the display. If the cursor is at the bottom line, a line feed will cause the display to scroll up one line and display the cursor at the new bottom line. If the cursor is at the bottom of the screen buffer, then a line feed causes the first line in the buffer to be lost. Backspace causes the cursor to move one column to the left, unless the cursor is at column zero; then it will move to the last character of the previous line. It will not backspace beyond column zero, line zero.

Escape Sequences

The HP-IL 80-Column Video Interface responds to 30 escape sequences. An escape sequence is a string of characters that is sent out on the loop as a series of data bytes and interpreted as a special instruction by the device receiving it. An escape sequence always starts with ESC (Escape) - code number 27 - and is followed by one or more characters that define the instruction. Escape sequences are used by the video interface to position the cursor, scroll through display memory, clear the display, etc.

Many different escape sequences can be passed through the HP-IL; however, the video interface responds to only a few of these. When the interface receives an escape sequence that it does not recognize, it displays all but the first two characters in the sequence. Escape sequences recognized by the interface are shown in Table A-1.

Escape Sequence	Description
ESC >	Cursor displayed. (Default.)
ESC <	Cursor not displayed.
ESC A	Cursor up. The cursor cannot be moved up beyond the top line of the screen. Cursor up never causes the screen to scroll, even if the top line of the screen is not the top line in the buffer.
ESC B	Cursor down. The cursor cannot be moved down beyond the bottom line of the screen. Cursor down never causes the screen to scroll, even if the bottom line of the screen is not the bottom line in the buffer.
ESC C	Cursor right. When the cursor is moved right past the end of the line (col 39 or col 79) it wraps to col 0 of the next line. When it is incremented past the end of line 23, it moves to col 0 of line 0.
ESC D	Cursor left. When the cursor is moved left past the left end of the line, it wraps to the last column (39 or 79) of the previous line. However, it will not move left past cursor position 0,0.
ESC E	Soft reset. Clear the screen memory, set the cursor to screen and buffer positions 0,0.

Table A-1 Escape Sequences for the MC00701A

Escape Sequence	Description
ESC H	Home cursor (current page). Move the cursor to relative position 0,0. Do not scroll screen memory.
ESC J	Clear screen memory from cursor to end of page.
ESC K	Clear screen memory from cursor to end of line.
ESC L	Insert line. Move all lines from (and including) the cursor line down one position. The last line in the buffer is lost. Write all blanks to the inserted line, and move the cursor to column 0.
ESC M	Delete line. Erase the line that the cursor is currently on, and move all other lines in the buffer up one position. Insert a blank line as the last line in the buffer.
ESC N	Enable insert character mode. Change the cursor to the insert cursor. Any input characters are inserted to the left of the cursor position, pushing the rest of the characters on the line towards the right side of the screen. If characters on the line are pushed past column 80 (40), then a new line is auto- matically inserted below the current line and the characters scroll onto it. This means no characters are lost when inserting, and lines longer than the screen width can be edited normally.
ESC O	Delete character. Erase the character at the cursor position and move all the rest of the characters on the line one position to the left to fill the gap. If the line was originally longer than 80 (40) columns, then characters are wrapped back from subsequent screen lines. Lines longer than 80 (40) columns can therefore be edited normally.
ESC Q	Switch to the insert cursor, but do not enable insert mode.
ESC R	Disable insert character mode. (Default.) Turn off insert character mode and go back to replace mode. Also switch to the replace cursor.
ESC S	Scroll up (move window down). Move the information within the screen window up one line, but keep the cursor in the same relative position on the screen. This effectively moves the cursor down one line with respect to the text.

Table A-1 Escape Sequences for the MC00701A (cont.)

Escape Sequence	Description
ESC T	Scroll down (move window up). Move the information within the screen window down one line, but keep the cursor in the same relative position on the screen. This effectively moves the cursor up one line wth respect to the text.
ESC Y	Enable Monitor Mode. All control characters will be displayed except NULL, which will be displayed as a space. No control codes or escape sequences will be interpreted as commands except ESC Z to disable Monitor Mode.
ESC Z	Disable Monitor Mode.
ESC [Display 80 columns by 24 lines. (Default.) Also causes the screen to be cleared.
ESC]	Display 40 columns by 20 lines. Also causes the screen to be cleared.
ESC /	Switch to NTSC mode. Also causes the screen to be cleared.
ESC =	Switch to PAL mode. Also causes the screen to be cleared.
ESC e	Hard reset. Clears screen memory, sets the cursor to screen and buffer positions 0, 0, and sets all soft switches to their default position.
ESC h	Home cursor (screen memory). Moves the cursor to screen and buffer positions 0, 0.
ESC j	Use Roman-8 character set.
ESC k	Use standard character set. (Default.)
ESC z	Performs an extensive self-test on the internal screen RAM. This test takes approximately 2½ minutes to com- plete, and during this time the screen stays blank and all HP-IL operations are stopped. When the test is complete, results can be obtained by requesting status. Bits 5 and 6 of the second status byte are set to "1" for RAM U10 or RAM U11 defective.
ESC % c r	Cursor relative address column and line; c and r are one byte binary numbers that represent the cursor position on the display screen.

appendix b MC00701A character sets

The two character sets provided with the unit are ASCII and ROMAN-8.

ASCII Character Set

The ASCII character set (Table B-1) contains 256 characters. Characters 0 through 127 are normal and characters 128 through 255 are inverse video. The standard 96 character ASCII set is characters 32 through 127 in normal video and characters 160 through 255 in inverse video. Control characters 0 through 31 and 128 through 159 are displayed only in monitor mode (ESC Y).

The ASCII character set is the default character set and is available on power up and after a hard reset (ESC e). It can also be set by sending an ESC k.

Table B-1 ASCII Character Set

Decimal	Graphic	Description]	Decimal	Graphic	Description
0		NUL (pull)]	64	@	Commercial at
1	S.,	SOH (start of heading)	1	65	Ă	Uppercase A
	Sr	STX (start of text)	1	66	В	Uppercase B
3	ĔŶ	ETX (end of text)	1	67	С	Uppercase C
4	Ē	EOT (end of transmission)	1	68	D	Uppercase D
5	Eo	ENQ (enquiry)	1	69	E	Uppercase E
6	Aĸ	ACK (acknowledge)	1	70	F	Uppercase F
7		BEL (bell)	1	71	G	Uppercase G
8	Bs	BS (backspace)	1	72	н	Uppercase H
9	HT	HT (horizontal tabulation)	1	73	1	Uppercase I
10	LF	LF (line feed)	1	74	J	Uppercase J
11	VT	VT (vertical tabulation)	1	75	к	Uppercase K
12	FF	FF (form feed)		76	L	Uppercase L
13	CR	CR (carriage return)	1	77	м	Uppercase M
14	So	SO (shift out)		78	N	Uppercase N
15	S	SI (shift in)	1	79	0	Uppercase O
16	DL	DLE (data link escape)	1	80	P	Uppercase P
17	D1	DC1 (device control 1 or X-ON)		81	Q	Uppercase Q
18	D ₂	DC2 (device control 2)		82	н	Uppercase R
19	D_3	DC3 (device control 3 or X-OFF)		83	5	Uppercase S
20	D₄	DC4 (device control 4)		04		
21	IN K	NAK (negative acknowledge)	1	00	U V	
22	SY E	STN (synchronous late)		87	Ň	
23	EB Cu	CAN (cancel)		88	×	
24	E.	EM (end of medium)		89	Ŷ	
26	S _P	SUB (substitute)		90	ż	Uppercase Z
27	Ec	ESC (escape)		91	ī	Opening square bracket
28	Fs	FS (file separator)		92	Ň	Reverse slant
29	Gs	GS (group separator)		93	i	Closing square bracket
30	Rs	RS (record separator)		94	^	Caret (upward arrow head)
31	Us	US (unit separator)		95	_	Underscore (low line)
32		Space		96	•	Opening single quote
33	!	Exclamation point		97	а	Lowercase a
34		Quotation mark		98	b	Lowercase b
35	#	Number sign (hash mark)		99	С	Lowercase c
36	\$	Dollar sign		100	d	Lowercase d
37	%	Percent sign		101	e	Lowercase e
38	,°	Ampersand		102	1	Lowercase
39	,	Apostrophe (closing single quote)		103	g	Lowercase g
40		Closing parenthesis		105		
42	·	Asterisk		106	i i	Lowercase i
43	+	Plus		107	, k	Lowercase k
44		Comma		108	- î - ´	Lowercase
45	-	Hyphen (minus)	1	109	m	Lowercase m
46		Period (point)	1	110	n	Lowercase n
47	/	Slant (solidus)	1	111	0	Lowercase o
48	0	Zero	1	112	р	Lowercase p
49	1	One		113	q	Lowercase q
50	2	Two		114	r	Lowercase r
51	3	Three		115	S	Lowercase s
52	4	Four	1	116	τ	Lowercase t
53	5			11/	u	Lowercase u
54	7	Six	1	110	v	Lowercase v
56	8	Fight	1	120	w	
57	9	Nine	1	120	÷.	
58		Colon	1	122	y 7	Lowercase z
59		Semicolon	1	123	ĺ	Opening brace (curly bracket)
60	, <	Less than sign	1	124	i	Vertical line
61	=	Equal sign	1	125	}	Closing brace (curly bracket)
62	>	Greater than sign	1	126	~	Tilde
63	?	Question mark	1	127		Delete
			J	· · · ·		

Decimal	Graphic	Description	Decimal	Grap
128		NUL (null) Inverse	192	@
129	Sн	SOH (start of heading) Video	193	Ā
130	Sx	STX (start of text)	194	В
131	Ex	ETX (end of text)	195	Ē
132	ET	EOT (end of transmission)	196	Ď
133	Eo	ENQ (enquiry)	197	F
134	Ăĸ	ACK (acknowledge)	198	F
135		BEL (bell)	199	G
136	Bs	BS (backspace)	200	Ĥ
137	HT	HT (horizontal tabulation)	201	1
138	LF	LF (line feed)	202	Ĵ
139	VT	VT (vertical tabulation)	203	ĸ
140	FF	FF (form feed)	204	Ĺ
141	CR	CR (carriage return)	205	M
142	So	SO (shift out)	206	N
143	S	SI (shift in)	207	0
144	DL	DLE (data link escape)	208	P
145	D 1	DC1 (device control 1 or X-ON)	209	Q
146	D ₂	DC2 (device control 2)	210	R
147	D_3	DC3 (device control 3 or X-OFF)	211	S
148	D₄	DC4 (device control 4)	212	Т
149	Nκ	NAK (negative acknowledge)	213	U
150	Sy	SYN (synchronous idle)	214	v
151	EB	ETB (end of transmission block)	215	w
152	CN	CAN (cancel)	216	Х
153	Eм	EM (end of medium)	217	Y
154	SB	SUB (substitute)	218	Z
155	Ec	ESC (escape)	219	[
156	Fs	FS (file separator)	220	\
157	Gs	GS (group separator)	221]
158	Hs	HS (record separator)	222	^
159	Us	US (unit separator)	223	-
160		Space	224	
101	!	Exclamation point	225	a
162		Quotation mark	226	D
163	#	Number sign (nash mark)	227	C
164	ې 0/-	Porcent sign	220	u
165	-70 8.	Ampersand	229	f
167	,a	Anostrophe (closing single quote)	230	
168	(Opening parenthesis	232	9 h
169	ì	Closing parenthesis	233	ï
170	·	Asterisk	234	i
171	+	Plus	235	ķ
172		Comma	236	Î
173	-	Hyphen (minus)	237	m
174		Period (point)	238	n
175	/	Slant (solidus)	239	0
176	0	Zero	240	p
177	1	One	241	q
178	2	Тwo	242	r
179	3	Three	243	s
180	4	Four	244	t
181	5	Five	245	u
182	6	Six	246	v
183	7	Seven	247	w
184	8	Eight	248	x
185	9	Nine	249	У
186	:	Colon	250	z
187	;	Semicolon	251	{
188	<	Less than sign	252	
189	=	Equal sign	253	}
190	>	Greater than sign	254	~
191	?	Question mark	255	
L				

Table B-1 ASCII Character Set (cont.)

cimal	Graphic	Description	
192	@	Commercial at Inv	erse
193	Ă	Uppercase A V	ideo
194	В	Uppercase B	1
195	С	Uppercase C	
196	D	Uppercase D	
197	E	Uppercase E	
198	F	Uppercase F	
199	G	Uppercase G	
200	Ĥ	Uppercase H	
201	i	Uppercase I	
202	j	Uppercase J	1
203	ĸ	Uppercase K	
204	i	Uppercase	
205	Ā	Uppercase M	
206	N	Uppercase N	1
207	0	Uppercase O	
208	P	Uppercase P	
209	ò	Uppercase Q	
210	Ř	Uppercase B	
211	S	Uppercase S	
212	Ť		
213	- ú		1
214	v		
215	Ŵ	Lippercase W	
216	Ŷ	Uppercase X	
217	Ŷ		
218	ż	Lippercase 7	
219	í.	Opening square bracket	
220	L .	Beverse slant	
221	ì	Closing square bracket	
222	,	Caret (upward arrow head)	
223	A	Underscore (low line)	
224	-	Opening single quote	
225	а	Lowercase a	
226	а Б	Lowercase b	
220	0	Lowercase o	
221	d	Lowercase d	
220	u o	Lowercase o	
230	f	Lowercase f	
231	'n	Lowercase a	
232	9	Lowercase b	
233		Lowercase i	
234	-	Lowercase i	
235	J K	Lowercase k	
236	i.	Lowercase	
237	m	Lowercase m	
238	n	Lowercase n	
230		Lowercase	
240	0	Lowercase o	
240	p	Lowercase p	
241	ч	Lowercase q	
242	1	Lowercase	
243	*	Lowercase s	
244	ι 	Lowercase	
246	u v		
240	v M		
247	w v		
240	ŝ		
250	у	Lowercase 7	
250	ŕ	Opening brace (outly bracks	• \
257		Vertical line	9
202	<u> </u>	Closing brood (ourly brookst	
200	(Tildo	/
254	~	Delete	
200		Delete	

Roman-8 Character Set

The Roman-8 character set (Table B-2) is ASCII plus a Roman extension, with normal video only; inverse video is not available with this character set. Roman-8 can be selected by sending and ESC j to the MC00701A.

Characters 0 - 15 are displayed in monitor mode only (ESC Y).

Decimal	Graphic	Description		Decimal	Graphic	Description
0		NUU (pull)	1	64	@	Commercial at
0	0	NUL (null)		64	<u>w</u>	
1	SH	SOH (start of heading)		65	Ä	Uppercase A
2	Sx	STX (start of text)		60	в	Uppercase B
3	Ex	EIX (end of text)		67	C	Uppercase C
4	ET	EOT (end of transmission)		68	D F	Uppercase D
5	Eo	ENQ (enquiry)		70	E .	
5	Aĸ	ACK (acknowledge)		70	r c	
6		BEL (Dell)		71	G	Uppercase G
0	DS L	DS (Dackspace)		72		
10		Fin (nonzontal tabulation)		73	<u>'</u>	
10		VT (vertical tabulation)		74	ĸ	Uppercase K
10	V T	FE (form food)		75	N I	
12	C C	CP (corrigge return)		70		
13	C R	Ch (carnage return)		78	N	
14	30	SU (shift in)		70		
15	5	DLE (data link occano)		80	P	
17		DC1 (dovice control 1 or X ON)		81	0	
18		DC1 (device control 101 x-ON)		82	B	Uppercase Q
10	D2	DC2 (device control 2 or X-OEE)		83	5	Uppercase S
20	D3	DC3 (device control 3 of X-OFF)		84	T	Uppercase T
20	N.	NAK (negative acknowledge)		85	i.	
22	S.	SYN (synchronous idle)		86	v	
22	E.	ETB (end of transmission block)		87	Ŵ	Lippercase W
24	C.	CAN (cancel)		88	×	
24	E.	EM (end of medium)		89	Ŷ	
26	EM So	SLIB (substitute)		90	7	Linnercase 7
27	F	ESC (escape)		91	r I	Opening square bracket
28	Fe	ES (file separator)		92	\ \	Reverse slant
29	G	GS (group separator)		93	ì	Closing square bracket
30	B _s	BS (record separator)		94	1	Caret (upward arrow bead)
31	Us	US (unit separator)		95		Underscore (low line)
32	03	Space		96	-	Opening single quote
33	!	Exclamation point		97	а	Lowercase a
34		Quotation mark		98	b	Lowercase b
35	#	Number sign (hash mark)		99	С	Lowercase c
36	\$	Dollar sign		100	d	Lowercase d
37	%	Percent sign		101	е	Lowercase e
38	&	Ampersand		102	f	Lowercase f
39	•	Apostrophe (closing single quote)		103	g	Lowercase g
40	(Opening parenthesis		104	h	Lowercase h
41)	Closing parenthesis		105	i	Lowercase i
42	•	Asterisk		106	j	Lowercase j
43	+	Plus		107	k	Lowercase k
44		Comma		108	1	Lowercase I
45	-	Hyphen (minus)		109	m	Lowercase m
46		Period (point)		110	n	Lowercase n
47	/	Slant (solidus)		111	0	Lowercase o
48	0	Zero		112	р	Lowercase p
49	1	One		113	q	Lowercase q
50	2	Two		114	r	Lowercase r
51	3	Three		115	S	Lowercase s
52	4	Four		116	t	Lowercase t
53	5	Five		117	u	Lowercase u
54	6	Six		118	v	Lowercase v
55	7	Seven		119	w	Lowercase w
56	8	Eight		120	×	Lowercase x
57	9	Nine		121	У	Lowercase y
58	:	Colon		122	z	Lowercase z
59	i.	Semicolon		123	1	Opening brace (curly bracket)
60	<	Less than sign		124	Ļ	Vertical line
61	=	Equal sign		125	}	Closing brace (curly bracket)
62	>	Greater than sign		126	~	lilde
63	Ý	Question mark	1	127		Delete

Table B-2 Roman-8 Character Set

Decimal	Graphic	Description
128		
120		
·		
160		
161	À	Uppercase A accent grave
162	Â	Uppercase A circumflex
163	È	Uppercase E accent grave
164	Ê	Uppercase E circumflex
165	ΞË	Uppercase E umlaut or diaeresis
166	î	Uppercase circumflex
167	Ϊ	Uppercase umlaut or diaeresis
168		Accent acute
169		Accent grave
170	^	Circumflex accent
171		Umlaut (diaeresis) accent
172	~	Tilde accent
173	Ù	Uppercase U accenmt grave
174	Û	Uppercase U circumflex
175	£	Italian Lira symbol
176		Over line (high line)
177		-undefined-
178		-undefined-
179	•	Degree (ring)
180	С	Uppercase C cedilla
181	° c	Lowercase c cedilla
182	Ñ	Uppercase N tilde
183	ñ	Lowercase n tilde
184	i	Inverse exclamation mark
185	i	Inverse question mark
186	0	General currency symbol
187	£	British pound symbol
188	¥	Japanese ven symbol
189	ş	Section sign
190	f	Dutch guilder symbol
191	¢	U.S. cent symbol
192	â	Lowercase a circumflex
193	ê	Lowercase e circumflex
194	ô	Lowercase o circumflex
195	û	Lowercase u circumflex
196	á	Lowercase a accent acute
197	é	Lowercase e accent acute
198	ó	Lowercase o accent acute
199	ú	Lowercase u accent acute
200	à	Lowercase a accent grave
201	è	Lowercase e accent grave
202	ò	Lowercase o accent grave
203	ù	Lowercase u accent grave
204	ä	Lowercase a umlaut or diaeresis
205	ë	Lowercase e umlaut or diaeresis

Table B-2	Roman-8	Character	Set	(cont.)
		0.1.4.40101		(000)

Decimal	Graphic	Description
206	ö	Lowercase o umlaut or diaeresis
207	ü	Lowercase u umlaut or diaeresis
208	Å	Uppercase A degree
209	î	Lowercase i circumflex
210	ø	Uppercase O crossbar
211	Æ	Uppercase AE ligature
212	å	Lowercase a degree
213	í	Lowercase i accent acute
214	ø	Lowercase o crossbar
215	æ	Lowercase ae ligature
216	Ä	Uppercase A umlaut or diaeresis
217	ì	Lowercase i accent grave
218	Ŭ	Uppercase O umlaut or diaeresis
219	Ü	Uppercase U umlaut or diaeresis
220	É	Uppercase E accent acute
221	ï	Lowercase i umlaut or diaeresis
222	B	Sharp s
223	Ô	Uppercase O circumflex
224	Á	Uppercase A accent acute
225	Ã	Uppercase A tilde
226	ã	Lowercase a tilde
227	Ð	Uppercase D with stroke
228	đ	Lowercase d with stroke
229	í	Uppercase accent acute
230	·ì	Uppercase I accent grave
231	Ó	Uppercase O accent acute
232	ò	Uppercase O accent grave
233	õ	Uppercase O tilde
234	õ	Lowercase o tilde
235	Š	Uppercase S with caron
236	š	Lowercase s with caron
237	Ú	Uppercase U accent acute
238	Ϋ́Υ	Uppercase Y umlaut or diaeresis
239	ÿ	Lowercase v umlaut or diagresis
240	τ ρ	Uppercase thorn
241	ъf	Lowercase thorn
242		-undefined-
243		-undefined-
244		-undefined-
245		
246		Long dash (horizontal bar)
247	1/4	One fourth (one guarter)
248	1/2	One half
249	•	Feminine ordinal indicator
250	- <u>•</u>	Masculine ordinal indicator
250		Opening quillemets (angle quotes)
201	—	Solid
202	—	Closing guillemete (angle guotes)
200	<i>"</i>	Plue/minus sign
254	<u> </u>	Poserved
200		

Notes:

appendix c theory of operation

Internal Design

The MC00701A can be conceptually divided into nine functional blocks as shown in Figure C-1. This section describes the functions of each block. Figure C-2 at the end of this section is a complete schematic diagram for the unit.

HP-IL Interface

The HP-IL interface (T1, U1) converts the serial analog pulse signals used to represent messages on the loop to parallel 8-bit bytes which can be used by the microprocessor. The interface is bi-directional; it both receives and converts messages from the loop and converts and transmits messages to the loop. Messages received which are intended for the MC00701A are transferred to the processor. Messages received which are not intended for the MC00701A are passed on to the next device on the loop.

Processor

The processor (U18) is a 8039 single-chip processor which utilizes an external 2732 (U2) 4K-byte EPROM for program storage. This EPROM contains the routines which run the video interface and communicate with HP-IL.

Video Controller

The heart of the video controller is a 6545A (U19), which controls all video timing. U19 controls the outputting of the screen buffer to the video monitor and keeps track of the cursor positon. In addition, U19 generates the vertical and horizontal synchronization and blanking signals required by the monitor.



Figure C-1 Video Interface Block Diagram

Screen Buffer

The screen buffer consists of two 2K x 8 RAM chips (U10, U11) and associated address and buffer logic. The memory is under the control of the video controller and is accessed sequentially to provide a constant stream of characters to the monitor. During the vertical retrace, which occurs 60 times per second*, the processor may take control of the buffer for approximately 2.3 milliseconds to write new text.

The buffer will hold 48 lines of text which may be either 80 or 40 columns wide, depending on the MC00701A display mode. In the 80-column mode, a window of 24 lines is visible on the display monitor at any one time. In the 40-column mode, a window of 20 lines is visible on the monitor. The remaining lines may be viewed by scrolling the display window. Lines which are scrolled off the screen are retained in the buffer. ESC S moves the text up (moves the window up through the buffer): ESC T moves the text down (moves the window up through the buffer). The buffer is not circular; if the window is at the top of the buffer, an ESC T will not wrap the last buffer line back to the top of the screen. Likewise, the window will not scroll past the end of the buffer in response to an ESC S.

The MC00701A responds to linefeeds differently depending on the position of the cursor with respect to the display window and the window position in the buffer. If the cursor is located on any line except for the last line of this window, a linefeed behaves identically to a cursor down command (ESC B). If the cursor is on the last line of the window and the window is not scrolled to the bottom of the buffer (in other words, the last line of the display is not the last line of the buffer) a linefeed will cause the text line immediately below the screen to be deleted. The text will scroll up one line and a blank line will appear at the bottom of the display in place of the deleted line. If the cursor is on the last buffer line, a linefeed causes the entire buffer to scroll up one line and a new blank line will appear at the bottom of the display at the bottom of the display in place of the display, deleting the first line of the buffer.

The MC00701A will accept lines which are longer than the display width. The line sent from the HP-IL controller may be any length terminated by a carriage return and linefeed in the usual manner. The video interface will insert implicit carriage return and linefeeds to divide a long line into as many display lines (40 or 80 columns) as may be required. Editing commands (insert line, insert character, delete line, delete character) will treat these long lines as a single line.

* NTSC only; vertical retrace occurs 50 times per second in PAL mode.

Timing

Timing for the MC00701A is derived from a 15.874 MHz crystal oscillator (U15). This frequency is used directly to form DOT CLK which shifts the character dots out of the video output shift register in the 80-column mode. In the 40-column mode, DOT CLK is 7.937 MHz (15.874 MHz divided by 2). DOT CLK is divided by 8 to form CCLK and CHRCLK. These clocks occur at the character rate (a character width is 8 video dots). The CCLK is used by the video control circuit, and CHRCLK is used by the video output circuit.

Character Generator

The character generator is contained in EPROM (U12). The EPROM contains dot matrix patterns for 256 individual characters.

Video Output

The video output circuit contains the video shift register (U13), the video output drivers (Q1, Q2), and the inverse video circuit (parts of U14 and U7). The shift register (U13) converts the character generator EPROM parallel output to a serial stream of dots at the DOT CLK rate. The video output circuit combines the dot output with sync and blanking signals from the video controller to provide a composite video output at J3. The inverse video circuit causes characters to be inverted by inverting the output of U13 using an exclusive-OR gate.

Power

Power is input to the MC00701A by means of a 9 VAC 1.2A AC adapter. Internally, the power supply consists of a bridge rectifier (CR6) and a LM7805 5 Volt voltage regulator (VR1). All internal circuits are driven by this 5 Volt output.

Controlling the Video Interface (HP-IL Messages)

Most controllers perform a specified operation by automatically sending a pre-programmed sequence of HP-IL messages around the interface loop. You would not be using the actual HP-IL messages in this case, but rather you would be using the HP-IL capabilities built into your calculator, computer, or HP-IL extension.

When the MC00701A 80-Column Video Interface receives a message on the HP-IL, it responds according to the following list. (It does not respond to messages that are not listed.) Except where noted, it automatically passes the message on to the next device on the loop.

Table C-1 MC00701A Responses to HP-IL Messages

Г

HP-IL MESSAGE	MC00701A Video Interface Response
COMMAND GROU	IP
IFC	Removes talker or listener status.
DCL	Clears screen memory; cursor set to position 0, 0; all mode switches set to their default state.
SDC	If the device is addressed as a listener, the device is cleared as in DCL.
AAU	Address is set to 31. Device will not respond to TAD or LAD.
TAD 0-31	If message address matches device address, device is removed from listener status and becomes a talker. If message address doesn't match, device is removed from talker status.
UNT	Device removed from talker status.
LAD 0-31	If message address matches device address, device is removed from talker status and becomes a listener. If message address doesn't match, no response. If message address is 31, device is removed from listener status.
UNL	Device is removed from listener status.
SAD 0-30	Following a TAD or LAD message, if primary and secondary addresses match device's addresses, device becomes a talker or listener.

Table C-1 MC00701A Responses to HP-IL Messages (Continued)

HP-IL MESSAGE	MC00701A Video Interface Response	
READY GROUP		
SST	If a talker, the device will source two bytes of status followed by an EOT. The first byte is device independent and is always 'OK' (\$80). The second byte is device dependent and is defined as follows:	
7 6 0 X	5 4 3 2 1 0 X X X X X X	
 	<pre> Screen width (0=80 col, 1=40 col) Character set (0=ASCII/INV, 1=Roman 8) Character set (0=ASCII/INV, 1=Roman 8) Character set (0=NTSC, 1=PAL) Character Set (0=Biplayed, 1=not displayed) Character Set (0=Biplayed, 1=Insert) Character Set (0=Good, 1=Bad) RAM U11 selftest (0=Good, 1=Bad)</pre>	
SDI	If a talker, the device will source the string "MC00701A" followed by a Carriage Return, Line Feed, and EOT.	
SAI	If a talker, the device will source a single byte with the value \$32 (50 dec.) followed by an EOT.	
NRD	If a talker, the last data frame sent becomes the last data frame. It is followed by an EOT.	
AAD 0-31	If the device has an assigned address, no response. If the message address is 31, no response. Otherwise, the device address is set to the message address, and the message address is incremented and passed on.	
AEP 0-31	If device has an assigned address, no response. If message address is 31, no response. If not preceded by AES message, no response. Otherwise, device primary address is set to message address.	
AES 0-31	If device has an assigned address, no response. If mes- sage address is 31, no response. Otherwise, the device secondary address is set to the message address, and the message address is incremented and passed on. (AES must be followed by AEP to establish valid device address.)	

Table C-1 MC00701A Responses to HP-IL Messages (Continued)

1

HP-IL MESSAGE	MC00701A Video Interface Response
ETO	If a talker, device will send this frame after sending the last DAB.
ETE	If a talker, device will send this frame if the most recent DAB sourced returned with an error.
RFC	No response. (Not passed to next device until this device is ready for the next command message.)
DATA GROUP	
DAB	If listener, accepts data byte. If talker, sources next data byte.
END	If listener, accepts data byte. If talker, sources next data byte.

Figure C-2 MC00701A Schematic Diagram





Notes:

appendix d care information

Care of the 80-Column Video Interface

The MC00701A 80-Column Video Interface requires very little maintenance. However, you should observe the temperature limits listed in Appendix E.

Troubleshooting

If at any time you suspect that your MC00701A 80-Column Video Interface or interface loop is not operating properly, you can verify operation by doing the following:

- 1. Check that all HP-IL devices are turned on.
- Verify that the HP-IL loop is continuous. Remember, device 1 is the first peripheral connected to the "OUT" HP-IL connector of the controller (the left-hand HP-IL connector if you are facing the back of the computer with the keyboard facing away from you).
- Does the monitor or TV display a blinking cursor when the MC00701A is turned on? If not check power to the MC00701A, the video cable (RF modulator connections and TV channel for television operation), monitor power, and screen intensity.
- 4. If the cursor is displayed, power down the system and reconnect the HP-IL with just the computer and MC00701A. If the system functions properly, one of the peripheral devices removed from the loop may be defective.

If you still experience difficulty after performing these procedures, refer to the Service Information Card included with this product.

Potential for Radio/Television Interference (for U.S.A. Only)

The MC00701A 80-Column Video Interface generates the uses radio frequency energy and may cause interference to radio and television reception. Your MC00701A Video Interface complies with the specifications in Subpart J of Part 15 of the FCC Rules for a Class B computing device. These specifications provide reasonable protection against such interference in a residential installation. If your Video Interface does cause interference to radio or television reception, which can be determined by powering down then powering up the Interface, you can try to eliminate the interference problem by doing one or more of the following:

- · Reorient the receiving antenna.
- Relocate the MC00701A with respect to the receiver.
- Move the MC00701A away from the receiver.
- Plug the AC adapter into a different outlet so that the MC00701A and the receiver are connected to different branch circuits.

If necessary, consult your dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet helpful: **How to Identify and Resolve Radio-TV Interference Problems.** This booklet is prepared by the Federal Communications Commission and is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock Number 004-000-00345-4

appendix e specifications

Physical

Size:	9.75 X 7.00 X 2.00 inches 24.8 X 17.8 X 5.1 cm.
Weight:	1.3 lbs. 0.585 kg.
Operating Temperature:	0° to + 55°C
Storage Temperature:	−40° to + 75°C
Electrical	
Power Requirements:	9 Vac @ 1 Amp (115 Vac adapter provided)
Text Mode Format:	24 text lines by 80 characters or 20 text lines by 40 characters
Screen Buffer:	48 text lines
Character Set:	96 character ASCII with inverse video or Roman-8
Character Format:	5X7 dot matrix plus 1 dot row descender
Video Format:	NTSC (USA, Japan, Canada) or PAL (Europe) (NTSC: National Television Standard Committee PAL: Phase Alternation Line)
Video Output:	1 Volt pk-pk into 75 ohms
Cursor Type:	Flashing block (replace mode) or flashing underbar (insert character mode)

, , ,	
Interface:	HP-IL compatible including device identifi- cation, accessory identification and status.
Status:	Device Independent Status (First Byte) = 128 Device Dependent Status (Second Byte): Bit 0: Screen width (0 = 80 col, 1 = 40 col) Bit 1: Character set (0 = ASCII, 1 = Roman-8) Bit 2: Video format (0 = NTSC, 1 = PAL) Bit 3: Cursor mode (0 = ON, 1 = OFF) Bit 4: I/R mode (0 = replace, 1 = insert) Bit 5: RAM U10 selftest (0=Good, 1=Bad) Bit 6: RAM U11 selftest (0=Good, 1=Bad)
Device ID:	MC00701A
Accessory ID:	50

Specifications (cont.)

Notes:

Notes:



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FULL SCREEN DISPLAY FOR THE HP-71

This section contains basic procedures for operating the Mountain Computer 80-Column Video Interface with an HP-71 Handheld Computer via the HP 82401A Interface.

Verify that the system has been connected as described in Section 1 (a blinking cursor should be displayed on the monitor or TV).

HP-71 Example

The HP-71 provides five ways for you to identify The Video Interface, by using one of five device specifiers:

- o Address The loop position of the Video Interface.
- o Device word The "class" or general type of the device: DISPLAY .
- o Accessory ID A number that identifies both the device and the class to which it belongs: 50 (see table on page 19 of the 82401A HP-IL Interface Owner's Manual for more details).

The following examples show how to set up the HP-71 so that it treats the Video Interface as a display when it is the only peripheral connected to the HP-IL loop. Before you begin, be sure to read Section 1: Getting Started, in the HP 82401A HP-IL Interface Owner's Manual.

1. Using the loop address:

DISPLAY IS :1 [ENDLINE]

2. Using the assign code:

ASSIGN IO ":TV" [ENDLINE] DISPLAY IS ":TV" (ENDLINE)

3. Using the device code:

DISPLAY IS : DISPLAY [ENDLINE]

4. Using the device ID:

DISPLAY IS :MC00701A [ENDLINE]

5. Using the Accessory ID:

DISPLAY IS \$50 [ENDLINE]

After typing in one of the preceding commands you should see:

> on the display screen.

The BASIC prompt followed by a flashing cursor.

If the display is a TV, place the unit in the 40-column mode by entering:

ESC] (see "HOW TO USE ESCAPE SEQUENCES" below)

Now keyboard entry and the results of any command normally displayed as a single line in the HP-71 window will be displayed in full screen on the monitor (or TV). Refer to the Escape Codes listed in Appendix A for additional information regarding cursor placement, scrolling, and operational modes.

NOTE:

If the display is changed back to the HP-71 internal display (DISPLAY IS *) after using the Mountain Video Interface, the Video Interface display will still operate, but the cursor will not appear.

HOW TO USE ESCAPE SEQUENCES

Escape sequences (ESC) can be keyed into the HP-71 using the following sequence of keystrokes:

[G] [CTRL] [G] [] followed by the character(s) to indicate which escape sequence you wish to execute. If you are using a TV or would like to see information displayed in 40 column mode, type the following:



When including escape sequences in BASIC programs you should use the character value of the escape character and concatinate it to the characters you wish to use:

40	DISP CHR\$(27)&"H"	!	Move cursor home (current page)
50	DISP CHR\$(27)&"J"	!	clear screen to end of page
60	DISP CHR\$ (27) & "% "& CHR\$ (20) & CHR\$ (20);	!	Move to screen position 20,20
70	DISP "Good morning Mr. Phelps"	!	Say hello
80	PUT "#43"	1	Press the [ATTN] key.

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